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Kaveephong Lertwachara and James J. Cochran

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An Event Study of the Economic Impact of Professional Sport Franchises on Local U.S. Economies

KAVEEPHONG LERTWACHARA

Thammasat University

JAMES J. COCHRAN

Louisiana Tech University

It is common for a city to use expensive incentives such as a state-of-the-art stadium or tax exemptions to induce a major professional sport team to relocate to or remain in its area. A city does so because it expects a professional sport team to enhance the local economy. In this article, the authors use an event study approach to evaluate the advisability of this strategy. Their results suggest that major league sports franchises from the four major U.S. team sports (baseball, football, basketball, and hockey) have an adverse impact on local per capita income for U.S. markets in both the short and long run.

Keywords: *event study; economic impact; local income*

It is common for a city to use expensive incentives such as a state-of-the-art stadium or tax exemptions to induce a major professional sport team to relocate to or remain in its area. A city does so because it expects a professional sport team to enhance the local economy (Barta, 2001; Bocanegra, 2000). Because tax revenues are used to pay for the incentives offered to these teams, it is prudent to investigate the resulting net effect of the professional sports franchises on the economic welfare of local taxpayers.

In this study, we examine both the short-term and long-term economic impact of professional sport franchises at the metropolitan statistical area (MSA) level by testing to determine if an unexpected increase in local income coincides with an expansion or relocation of a professional sports franchise. We evaluate both per capita income and its growth rate using the event study model and consider the four major U.S. team-sport leagues: Major League Baseball (MLB), the National Basketball Association (NBA), the National Football League (NFL), and the National Hockey League (NHL).

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The event study framework has been widely employed in finance problems to examine the unexpected return on investment that coincides with the occurrence of an extraordinary event. The event can be any unusual occurrence that could affect the return on investment including (a) firm-specific events such as announcement of a stock split, takeover bid, or bankruptcy; or (b) market-wide events such as announcement of a tax-cut, a change in the unemployment rate or interest rate, or an international trade agreement. In this approach, the market returns are regressed against the individual's returns using data before the event date. The parameter estimates are then used to compute the expected individual's return after the event date, and the resulting error terms are analyzed. The relationship between error terms and firms' characteristics can also be examined further. Extensive details regarding event study methodology can be found in Henderson (1990). Through this approach, we incorporate important factors that previous studies fail to consider simultaneously: causality, overall economy, specific characteristics of local areas, and events' ages.

BACKGROUND

Researchers have studied the impact of sports from a variety of perspectives. Coates and Humphreys (2001) find no significant economic impact of strikes and lockouts of the professional sport leagues in the United States from 1969 through 1996. Many other studies such as Bird (1982), Sutherland and Haworth (1986), and Szymanski (2001) examine sport industries outside the United States with a primary focus on those in the United Kingdom. However, a limited number of studies investigate the economic impact of a professional sports franchise on local economies. Baade (1994), Baade and Dye (1998, 1990), Coates and Humphreys (1999), Noll and Zimbalist (1997), and Gius and Johnson (2001) apply regression analysis in their investigations. Baade (1994), Baade and Dye (1998, 1990), and Noll and Zimbalist (1997) find that professional sports franchises have no significant economic impact on local economies. Baade and Matheson (2001) investigate the economic impact of NBA's all-star game since 1973 and report a negative net economic impact on host cities. However, Gius and Johnson (2001) conclude that cities with multiple major professional sports franchises have higher per capita income than cities that have no more than one major professional sports franchise.

Previous studies have failed to address some important issues. First, the overall U.S. economy should be taken into consideration to account for macroeconomic conditions that influence local economies. Second, these macroeconomic conditions affect local economies differently depending on the local economic base (i.e., manufacturing, agriculture, or service). Therefore, the specific characteristics of each local economy must also be included in the model. Third, previous studies compare effects of events that occur in different points in time. For a variety of reasons, comparison of an effect of an event that occurred 10 years ago to the effect of a relatively recent event is unreasonable. Finally, the direction of

causality is still undetermined. The standard regression approach detects linear relationship between dependent and independent variables but does not suggest a direction of causality.

The event study model attempts to address these issues. In this study, an event is defined as the establishment of a new professional sports team in an MSA through either expansion or relocation. We use per capita income at the MSA level and gross domestic product (GDP) as proxies for the local and overall economy, respectively, to estimate a linear relationship between the nation's economy and economy of each MSA. The resulting intercept and slope associated with an MSA embodies specific characteristics of the corresponding economy. We also employ relative dates instead of actual dates to compare effects of the event given the length of time since the event occurred. In addition, we address the causality issue by using pre-event data to estimate parameters and using the estimated parameters and post-event data to estimate the unexpected income.

THE DATA

Annual data from the period 1969 to 2000 are used in this analysis. The GDP and CPI are collected from the Web site of the Federal Reserve Bank of St. Louis (2001). Data on professional sport franchises are obtained from CBS SportsLine (2001), NBA Media Ventures, LLC (2001), and official league and team Web sites (National Hockey League, 2001). Finally, the per capita income at the MSA level is gathered from the Web site of the Bureau of Economic Analysis (<http://www.bea.gov/>). To ensure the estimation data set includes at least 10 observations per MSA, we limit our analysis to expansions and relocations of professional sports franchises during the period 1980 to 2000 in the United States. From 1980 to 2000, 4 U.S. MSAs gained MLB franchises, 7 gained NBA franchises, 9 gained NFL franchises, and 13 gained NHL franchises through either expansion or relocation.

METHODOLOGY

We employ an event study approach in the analysis. In our analysis, there are at least two alternatives to take the inflation into account: adjusting all unexpected income from different time periods to the dollar figure at a particular time or using the growth rate instead of nominal value of the income. For the first alternative, we identify the event date and separate data into two groups: estimate period data (the period from 1969 until 1 year prior to the expansion or relocation event) and event period data (the period immediately following the expansion or relocation event). Note that we exclude the year prior to the first season to eliminate the announcement effect identified by French and Disher (1997), who found that Olympic host cities experience an economic reaction that begins when the host city is announced. We use the estimate period data to explore linear relationships between

market returns and the economic indicators for cities following Equation 1. We then use the estimated parameters in conjunction with the event-period data to compute the unexpected income using Equation 2. Finally, we use the CPI to adjust the unexpected income so that all unexpected incomes are measured in year 2000 dollars.

$$INC_{ij} = b_{0i} + b_{1i}GDP_j \quad (1)$$

$$\epsilon_{ij} = INC_{ij} - b_{0i} - b_{1i}GDP_j, \quad (2)$$

where

INC_{ij} = per capita income for the i^{th} MSA in year j

GDP_j = U.S. GDP in year j

b_{0i} = intercept for the i^{th} MSA

b_{1i} = slope for the i^{th} MSA

ϵ_{ij} = unexpected income for the i^{th} MSA in year j

The second alternative is similar except that we use the annual growth rates of per capita income and GDP in the calculation. The annual growth rate of per capita income is computed as follows:

$$GIN_i = \frac{INC_i - INC_{i-1}}{INC_{i-1}}, \quad (3)$$

where

GIN_i = growth rate of per capita income at year i

INC_i = per capita income at year i

As a result, we lose the 1st-year date and Equations 1 and 2 become:

$$GIN_{ij} = b_{02i} + b_{12i}GDP_j \quad (4)$$

$$\epsilon_{ij} = GIN_{ij} - b_{02i} - b_{12i}GDP_j, \quad (5)$$

where

GIN_{ij} = per capita income for the i^{th} state in year j

GDP_j = U.S. GDP in year j

b_{02i} = intercept for the i^{th} MSA

b_{12i} = slope for the i^{th} MSA

ϵ_{ij} = the unexpected income for the i^{th} MSA in year j

We then regress the unexpected income against the number of existing teams for MLB, NBA, NFL, and NHL. The unexpected income for year 0, 1, 2, 3, and 4 represent short-term effects, whereas the cumulative unexpected income from year 0 to year 10 represents the long-term impact.

It is important to note that the explicit assumptions of constant slope and intercept over time and across cross sectional units of panel data are not relevant to this research; we apply regression analysis to panel data consisting of existing franchises to estimate league-wide intercepts and slopes, and we are not concerned with how the equation fits individual existing franchises. We are concerned only with how an estimated league-wide regression equation fits a new or relocated franchise (i.e., the pattern of residuals that the model generates when applied to values of the independent variables for a new or relocated franchise). Interestingly, by assessing the residuals that a model generates when applied to values of the independent variables for a new or relocated franchise, we are in some way assessing whether the estimated league-wide regression parameters accurately describe the performance of a new or relocated franchise.

EMPIRICAL RESULTS

Tables 1 and 2 summarize results of the first alternative (the adjusted dollar approach), whereas Tables 3 and 4 summarize results of the second alternative (the growth-rate approach). Table 1 provides a summary of the short-term and long-term unexpected income by type of sport. The results suggest that an estimated decrease in per capita income of \$1,116.96 occurs during any franchise's 1st year (regardless of sport) in the MSA and \$13,901.08 during a 10-year period immediately following the establishment or relocation of the franchise. The highest long-run cost is associated with NBA teams; however, the decrease in per capita income associated with a professional basketball team during the first 4 years is not statistically significant. On the other hand, the negative effect of an MLB team is significant only in the short-run, whereas the negative impact of both NFL and NHL franchises are statistically significant in both short and long run. The overall results support the findings of prior research that professional sports franchises do not have a positive economic impact on local economies. In Table 1, we also provide the results of independent t test of the null hypothesis that expanding and relocating teams economically affect the local income the same way. This test is accomplished through inclusion of a dummy variable representing the type of the new major league market (expansion or relocation) in the regression for which the ϵ_{ij} term is the response variable (2). The consistently large p values (all of which exceed 0.50) imply that the economic impact of an expansion team and a relocated team do not differ. Table 2 presents results of regressing unexpected income on the number of existing teams categorized by type of sports. The linear regression analyses indicate that, in the long run, an additional football team would increase the unexpected income by \$109.99, whereas an additional basketball team would decrease the unexpected income by \$88.14. However, a change in per capita income within the range of $-\$88.14$ and $+\$109.99$ more than 10 years is not substantial. Thus, we would suggest that the number of existing teams has no meaningful impact on the local income.

In Table 3, we provide evidence that a professional sports franchise significantly slows the growth rate of per capita income in both the short run and the long-run.

TABLE 1: Short- and Long-Term Impact on Per Capita Annual Income (in \$)

Type	Year 0	Year 1	Year 2	Year 3	Year 4	Cumulative 10 Year						
Overall	-1116.96	0.0001	-1365.46	0.0001	-1769.17	0.0001	-2107.75	0.0001	-13901.08	0.0001		
Major League Baseball	-1463.91	0.0006	-2141.31	0.0014	-2266.92	0.0033	-2179.58	0.2335	-2562.48	0.2813	-12581.74	0.0915
National Basketball Association	-372.61	0.2661	-676.82	0.1136	-821.70	0.1662	-1004.74	0.1152	-1674.34	0.0743	-22854.05	0.0100
National Football League	-1252.95	0.0007	-1433.63	0.0059	-1753.95	0.0003	-1869.73	0.0034	-2456.38	0.0038	-14403.54	0.0411
National Hockey League	-1393.70	0.0001	-1498.50	0.0008	-2035.82	0.0012	-2205.47	0.0005	-2112.44	0.0054	-9400.93	0.0112
Expansion	-0.07	0.9410	0.51	0.6160	0.11	0.9110	0.05	0.9638	0.42	0.6760	-0.51	0.6107

TABLE 2: Effects of Number of Existing Teams on the Per Capita Income

Type	Year 0	Year 1	Year 2	Year 3	Year 4	Cumulative 10 Year						
Intercept	-372.42	0.8189	-848.46	0.6923	-2309.57	0.4745	-2098.03	0.5341	-409.61	0.9007	-362.36	0.8141
Major League Baseball	-11.949	0.7424	28.51901	0.5506	-7.98197	0.9162	61.71079	0.2846	32.61765	0.7166	-7.63112	0.8244
National Basketball Association	-48.6055	0.0205	-32.5001	0.1897	-72.1448	0.0289	-63.2458	0.1080	-114.459	0.0576	-88.1446	0.0001
National Football League	64.17077	0.0844	40.59962	0.4161	134.4137	0.0723	65.30706	0.4649	100.1614	0.3219	109.9934	0.0034
National Hockey League	-9.64385	0.6362	-38.8095	0.1286	-42.924	0.2825	-53.4099	0.2032	-33.9533	0.4901	-29.0134	0.1264
R^2	0.4151	0.3720	0.4490	0.4050	0.4358	0.1960						
p value for the F statistics	0.0076	0.0251	0.0109	0.0350	0.0363	0.0001						

TABLE 3: Short- and Long-Term Impact on the Growth Rate of Per Capita Income

Type	Year 0	Year 1	Year 2	Year 3	Year 4	Cumulative 10 Year						
Overall	-0.00449	0.2912	-0.00963	0.0020	-0.01373	0.0004	-0.00961	0.0102	-0.01446	0.0310	-0.07003	0.0022
Major League Baseball	0.02032	0.4866	-0.02474	0.0120	0.00268	0.6298	-0.00824	0.3856	-0.01400	0.4284	-0.02760	0.0773
National Basketball Association	-0.00612	0.3886	-0.01314	0.1177	-0.01476	0.0970	-0.01706	0.0749	-0.03080	0.0912	-0.20540	0.0003
National Football League	-0.01391	0.0100	-0.00701	0.2344	-0.02107	0.0048	-0.00511	0.5435	-0.02009	0.0519	-0.07078	0.0526
National Hockey League	-0.00508	0.2155	-0.00219	0.5440	-0.01194	0.1278	-0.00713	0.1441	0.00658	0.2076	-0.00328	0.9240
Expansion	-0.66	0.5146	1.22	0.2327	0.46	0.6491	1.36	0.1875	1.27	0.2220	0.04	0.9656

TABLE 4: Effects of Number of Existing Teams on the Growth Rate of Per Capita Income

	Year 0	Year 1	Year 2	Year 3	Year 4	Cumulative 10 Year						
Intercept	0.1337	0.3846	0.0014	0.9897	-0.0939	0.5275	-0.03443	0.7946	-0.3139	0.1211	-0.0943	0.0920
Major League Baseball	0.0041	0.6294	-0.0033	0.5725	-0.0061	0.4919	0.0067	0.2427	0.0051	0.7063	0.0026	0.4117
National Basketball Association	-0.0010	0.8353	-0.0045	0.1349	-0.0084	0.0277	-0.0044	0.2471	-0.0037	0.6662	-0.00421	0.0215
National Football League	-0.0109	0.2074	0.0049	0.4190	0.0158	0.0673	-0.0018	0.8398	0.0152	0.3132	0.0042	0.2095
National Hockey League	0.0036	0.4578	0.0025	0.4142	0.0007	0.8781	0.0005	0.9095	-0.0073	0.3221	0.0002	0.9041
R^2	0.1386	0.1076	0.2176	0.2125	0.1552	0.0494						
p value for the F statistics	0.4233	0.6040	0.2498	0.3120	0.5530	0.0303						

The decrease rates range from 0.33% of a hockey team to 7.08% of a football teams. Relocation or expansion of the NFL into an MSA coincides with a declining growth rate in per capita income in both the short and long-run, whereas relocation or expansion of the NBA into an MSA corresponds with only a short-run decline in the growth rate of per capita income (and no long-run change in the growth rate of per capita income). The negative impact of MLB and NHL teams is neither substantial nor statistically significant. Results of the independent t test of effects between expansion and relocation teams are also reported with no significant differences detected, which implies that both expansion and relocation teams similarly affect the growth rate of income. In Table 4, results indicate no relationship between the growth rate of income and the number of existing teams. Thus, the number of existing teams does not appear to be related to the growth rate of income.

It is interesting to note that an inspection of error terms by cross sectional unit shows no discernable pattern, suggesting that the assumptions of constant slope and intercept over cross-sectional units are reasonable.

CONCLUSIONS

Municipalities compete fiercely for professional sports franchises, offering concessions and incentives in the hundreds of millions of dollars to entice an existing franchise to relocate or convince a league to award them an expansion franchise. This competition continues despite strong economic evidence that a professional sport team does not have a positive impact on the local economy. However, the research that has produced this evidence fails to consider some important factors: inflation, causality, overall economy, specific characteristics of local areas, and events' ages. Our article takes inflation into account and employs the model of the event study to mitigate these concerns.

The results of our research confirm prior research findings—we find that a professional sport team does not have a positive economic impact on the local community. The results indicate that estimated local income in the presence of a professional sports franchise is lower than what would be estimated in the absence of a professional sports franchise. Our results imply that on the basis of the incremental local per capita income they generate, professional sport franchises do not justify the abatements, concessions, and incentives that are used to attract them to an MSA. If their goal is to increase their citizens' per capita income, cities should stop using these tactics to attract professional sports teams to their markets.

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Kaveephong Lertwachara, DBA, is an instructor in the College of Innovative Education at Thammasat University. His research interests include statistical applications in finance and economics.

James J. Cochran, PhD, is an assistant professor in the Department of Marketing and Analysis at Louisiana Tech University. His research interests include computational statistics, sample based optimization, predictive inference, and applications in marketing, sports, medicine, and politics.